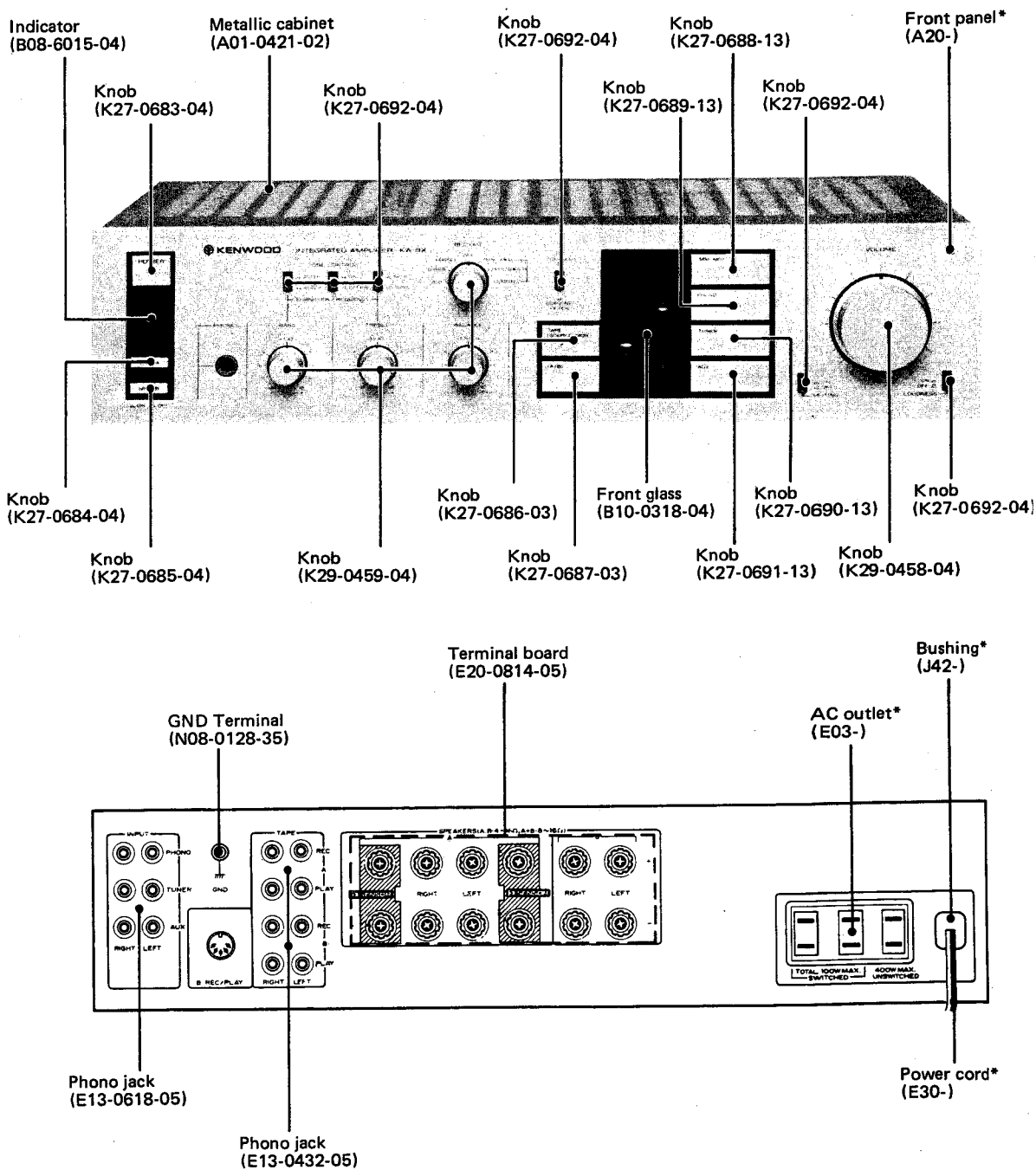




KA-9X/9XC

INTEGRATED AMPLIFIER

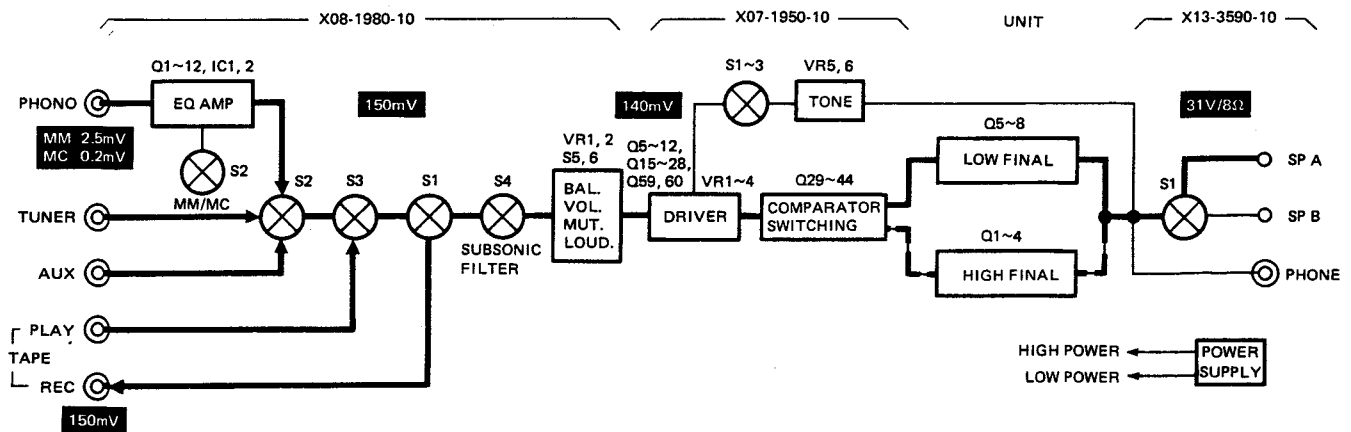


* Refer to Parts List on page 11.

SERVICE MANUAL

BLOCK & LEVEL DIAGRAM/CIRCUIT DESCRIPTION

BLOCK & LEVEL DIAGRAM



CIRCUIT DESCRIPTION

The main amplifier employed in KA-9X (7X) consists of a 3-stage differential class A voltage amplifier and a 3-stage Darlington class B SEPP. Unlike the conventional circuit configuration, the final stage has a couple of circuits: one for low voltages and one for high voltages. During normal operation, transistors (Q5~Q8) on the low-voltage side perform their function, reducing the heat generation and power consumption of the amplifier (Refer to "Heat Generation and Power consumption of Amplifier" on the next page). During high power output operation, transistors (Q1~Q4) on the high-voltage side become active, ensuring optimum operation of the amplifier with minimum heat generation. For optimizing the amplifier operation, a comparator circuit, holding circuit, and distributor circuit, consisting of Q29~Q44, are also provided.

The following explains the amplifier operation at the positive side of channel L (see Figure 1).

The input signal from the emitter Q25 enters the distributor circuit Q29/Q33. Normally, Q33 is turned on by R77 and transfers the input signal to Q5 on the low-voltage side. If the input signal level is higher than the reference voltage V_x (approximately 30V) of the comparator Q41, Q41 is turned on through the emitter of Q5 and D15. At the same time, Q37 of the holding circuit turns on, causing Q29 of the distributor circuit to turn on. When Q29 turns on, the Q33 base-emitter bias becomes zero, turning off Q33. Then, the input signal is transmitted to Q1 on the high-voltage side, allowing high power output operation. D11 and R73 are provided to impart hysteresis characteristic ($V_x \rightarrow V_x'$, approximately 23V) to the comparator circuit and ensure distribution operation. D15 is provided for the comparator Q41, which normally has an inverse bias. The holding circuit (Q37, C27, R91 and R95) keeps Q29 on for a certain period of time (t), enabling operation of the high-voltage side. This circuit inhibits the distributor circuit operation if the input signal level and frequency are substantially high, and thereby prevents the distortion factor from deteriorating.

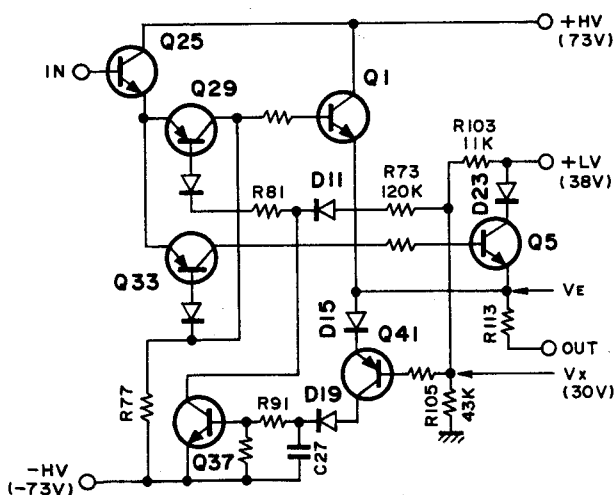


Fig. 1

CIRCUIT DESCRIPTION

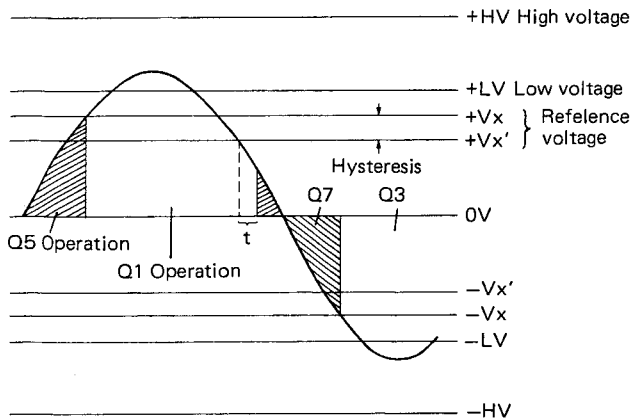


Fig. 2 50Hz, 60W Output waveform

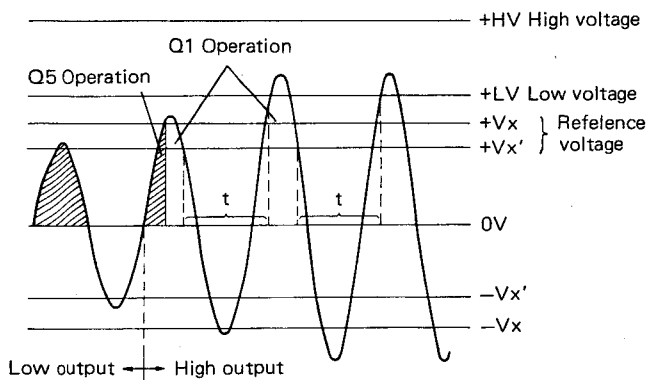


Fig. 3 1kHz Output waveform

Heat Generation and Power Consumption of Amplifier

The main amplifier which drives the speaker provides the speaker with electric energy, which is converted into acoustic energy by the speaker. This conversion of energy requires the operation called power amplification. Since in reality perfect power amplification is impossible (the theoretical efficiency for class B amplifier is 78.5%), substantial amounts of heat are generated in process.

Typical heat generating parts are:

- (1) Final transistor
- (2) Power transformer
- (3) Power circuit (rectifying diodes, etc.)
- (4) Lamps, etc.

The following explanation is concerned with item (1), above. Consider a class B SEPP circuit as shown in Figure 4. The power consumption P_c of each of the transistors can be expressed as the product of the collector current I_c and the collector-emitter voltage V_{CE} . Thus,

$$P_c = I_c \times V_{CE} \dots\dots\dots(1)$$

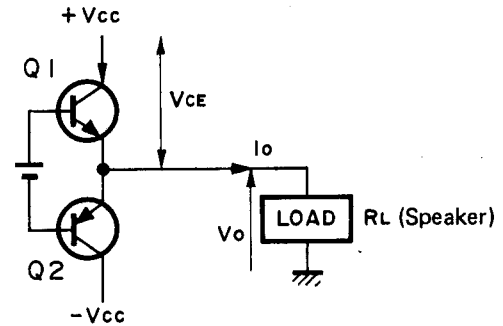


Fig. 4 SEPP Circuit

The instantaneous value of P_c expressed in equation (1) represents the transistor power consumption at given instant, which is lost in the form of heat. That is, P_c is a wasted power not supplied to the load.

On the other hand, the power P supplied to the load is calculated by the following equation:

$$P_o = I_o \times V_o \dots\dots\dots(2)$$

Assuming the amplifier output voltage V_o as having a sine wave ($V_o = V_o \sin \omega t$) and ignoring idle current, the wave forms of the output voltage V_o and output current I_o appear as shown in Figure 5. (For simplicity, the load is assumed as a pure resistor.)

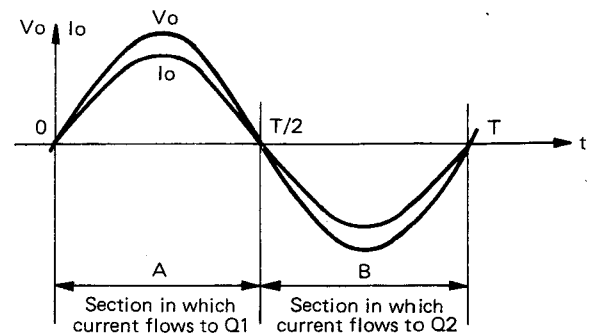


Fig. 5 SEPP Circuit output current/voltage

The power consumption of Q1 alone is calculated as follows:

$$P_c = I_c \times (V_{cc} - V_o)$$

CIRCUIT DESCRIPTION

Since $I_o = I_c$ in section A and $I_c = 0$ in section B (see Figure 5), the actual power consumption irradiated as heat is the time average of P_c ($\overline{P_c}$), which is calculated as follows :

$$\begin{aligned}\overline{P_c} &= \frac{1}{T} \int_0^T P_c dt \\ &= \frac{1}{T} \int_0^{\frac{T}{2}} I_o (V_{cc} - V_o) dt + \int_{\frac{T}{2}}^T 0 dt \\ &= \frac{1}{T} \int_0^{\frac{T}{2}} \frac{V_o}{R_L} \sin \omega t (V_{cc} - V_o \sin \omega t) dt \\ &= \frac{1}{T} \int_0^{\frac{T}{2}} \frac{V_{cc} V_o}{R_L} \sin \omega t dt - \frac{1}{T} \int_0^{\frac{T}{2}} \frac{V_o^2}{R_L} \sin^2 \omega t dt \\ &= \frac{1}{2R_L} \left(\frac{2}{\pi} V_{cc} V_o - \frac{V_o^2}{2} \right)\end{aligned}$$

To obtain the maximum value of $\overline{P_c}$, $\overline{P_c}$ is differentiated by V_o as follows :

$$\frac{d\overline{P_c}}{dt} = \frac{1}{2R_L} \left(\frac{2}{\pi} V_{cc} - V_o \right)$$

Thus, $\overline{P_c}$ becomes maximum when $V_o = 2/\pi V_{cc}$.

$$\overline{P_{c\max}} = \frac{1}{\pi^2} \frac{V_{cc}^2}{R_L}$$

The greater the power supply voltage V_{cc} , the greater becomes the $\overline{P_{c\max}}$. Similarly, since the time average of P_o ($\overline{P_o}$) is supplied to the load, $\overline{P_o}$ is calculated as follows :

$$\begin{aligned}\overline{P_o} &= \frac{1}{T} \int_0^T I_o \times V_o dt \\ &= \frac{1}{T} \int_0^{\frac{T}{2}} \frac{V_o^2}{R_L} \sin^2 \omega t dt\end{aligned}$$

$$\overline{P_o} = \frac{V_o^2}{2R_L}$$

Needless to say, the power supplied to the load becomes maximum when $V_o = V_{cc}$. Hence,

$$\overline{P_{o\max}} = \frac{V_{cc}^2}{2R_L}$$

Namely,

$$\frac{\overline{P_{c\max}}}{\overline{P_{o\max}}} = \frac{2}{\pi^2} \doteq 0.203 \dots \dots$$

Assuming $\overline{P_o}$ at $V_o = 2V_{cc}/\pi$ as $\overline{P_{o1}}$

$$\overline{P_{o1}} = \frac{4}{\pi^2} \cdot \frac{V_{cc}^2}{2R_L} \doteq 0.405 \overline{P_{o\max}}$$

Thus, P_c of a single output transistor of class B SEPP becomes maximum when the output is approximately 40% of the full power, the maximum value being approximately 20% of the full power.

Note that it is normally necessary to pass an idle current (approximately 20 to 100mA). This current also increases in proportion to the voltage. Note also that if the load is not a pure resistor, but has a reactance component (e.g., speaker load), a reactive power component occurs. This reactive power should be consumed by the amplifier, hence the amount of heat generated inside the amplifier (output transistor) further increases.

Since P_c is proportional to the full power, amplifiers whose full power is smaller (i.e., amplifiers with lower power supply voltage) produce smaller amounts of heat. This means that the amount of heat generated by the final transistor and the radiator size can be reduced by using an amplifier of low power supply voltage during normal operation and by operating another amplifier of high power supply voltage only when a high output is required.

Also, by using the same winding for the power transformer to pick up both high and low voltages, it is possible to reduce the transformer internal loss and the transformer size, since the current does not constantly flow through the high-voltage side. The power transformer and radiator occupy the greater part of the amplifier weight, space, and cost. The reduction in size of these components means, therefore that an amplifier of greater power output can be offered to users at a lower cost.

ADJUSTMENT/REGLAGE/ABGLEICH

ADJUSTMENT

NO.	ITEM	INPUT SETTINGS	OUTPUT SETTINGS	AMPLIFIER SETTINGS	ALIGNMENT POINTS	ALIGN FOR	FIG.
1	OFFSET	—	Connect a DC voltmeter to SPEAKER A terminals.	SPKR : A VOLUME : 0	VR1 (L) VR2 (R)	0V	
2	IDLE CURRENT	—	Connect a DC voltmeter across R113 (L), R114 (R).	SPKR : OFF VOLUME : 0	VR3 (L) VR4 (R)	8mV	

REGLAGE

Nº	ITEM	REGLAGE DE L'ENTREE	REGLAGE DE LA SORTIE	REGLAGE DE L'AMPLIFICATEUR	POINTS L'ALIGNMENT	ALIGNER POUR	FIG.
1	OFFSET	—	Brancher le voltmètre de CC aux bornes de sortie + et —. (SPKR : A)	SPKR : A VOLUME : 0	VR1 (L) VR2 (R)	0V	
2	REGLAGE DU COURANT DE POLARISATION	—	Connexer un voltmètre CC sur R113 (L), R114 (R).	SPKR : OFF VOLUME : 0	VR3 (L) VR4 (R)	8mV	

ABGLEICH

NR.	GEGENSTAND	EINGANGS-EINSTELLUNG	AUSGANGS-EINSTELLUNG	VORSTÄRKER EINSTELLUNG	ABGLEICH-PUNKTE	ABGEICHEN FÜR	ABB.
1	OFFSET	—	Einen Gleichspannungsmesser über SPKR : A anschließen.	SPKR : A VOLUME : 0	VR1 (L) VR2 (R)	0V	
2	LEERLAUFS	—	Einen Gleichspannungsmesser über R113 (L), R114 (R) anschließen.	SPKR : OFF VOLUME : 0	VR3 (L) VR4 (R)	8mV	

Note :

A self-restoring thermal switch is built into the power transformer. This switch is activated to cut output of the transformer when its temperature rises beyond 150° C. The amount of time required for recovery is approximately 5 minutes.

Remarque :

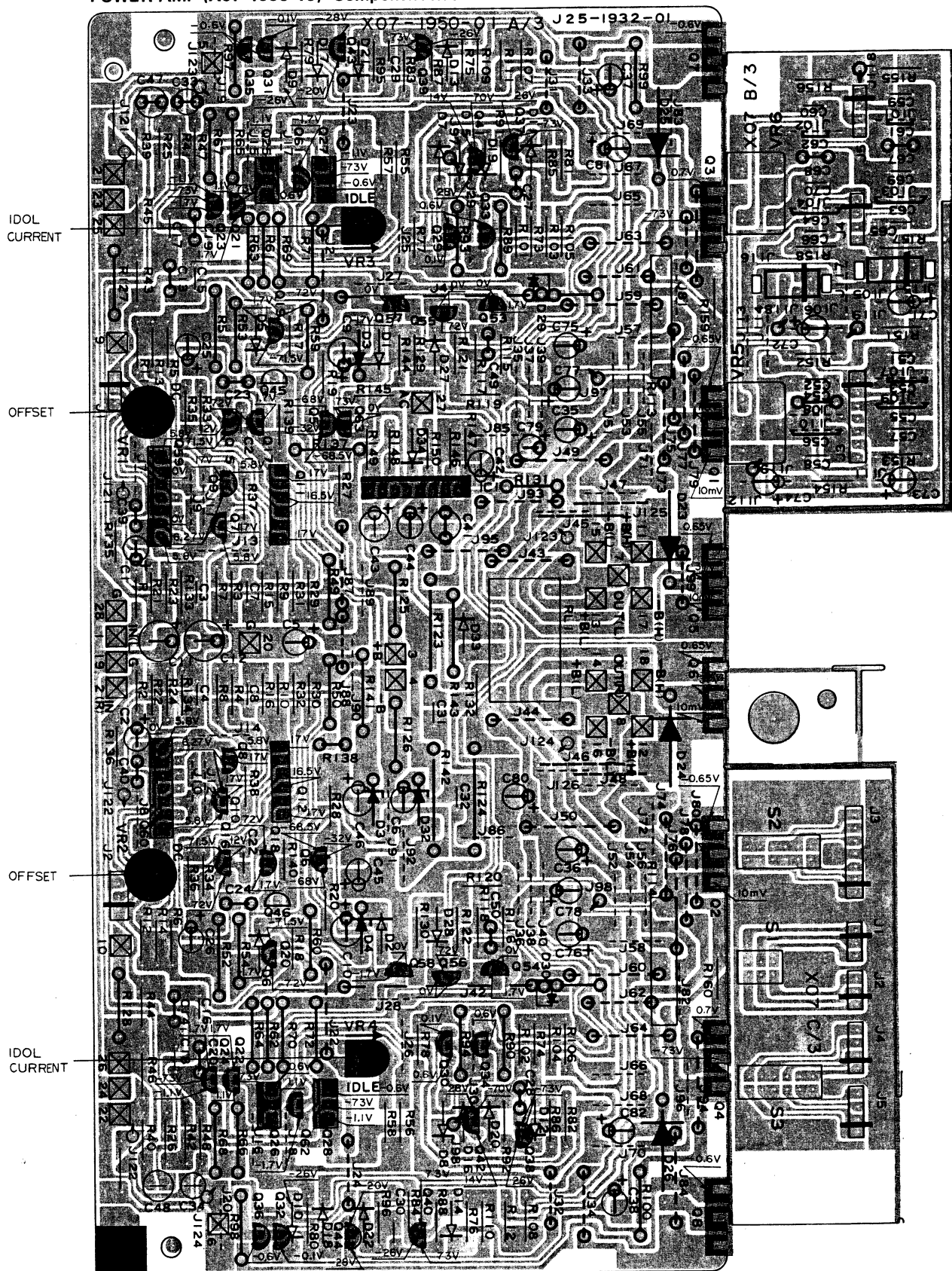
Un commutateur thermique à auto-déclenchement est incorporé au transformateur de puissance. Ce commutateur est activé pour couper l'alimentation du transformateur lorsque sa température s'élève au dessus de 150° C. Cinq minutes sont environ nécessaires pour que le transformateur soit de nouveau mis sous tension.

Bemerkung :

Ein Rückstell-Thermoschalter ist in den Netztransformator eingebaut. Der Schalter wird aktiviert, wenn seine Temperatur über 150° ansteigt, wobei der Transformatorausgang abgetrennt wird. Die zur Erholung erforderliche Zeit beträgt ca. 5 Minuten.

PC BOARD

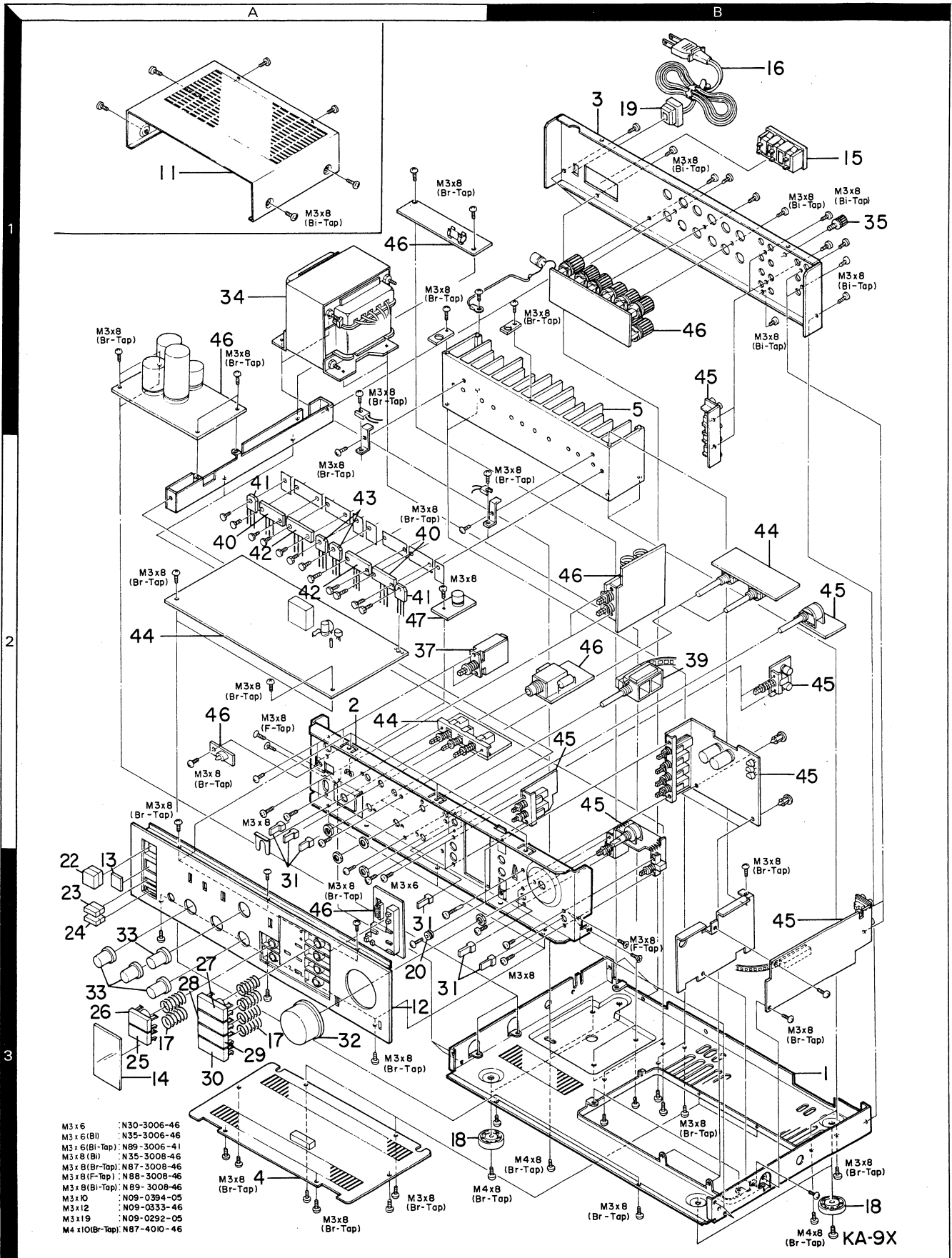
POWER AMP (X07-1950-10) Component side view

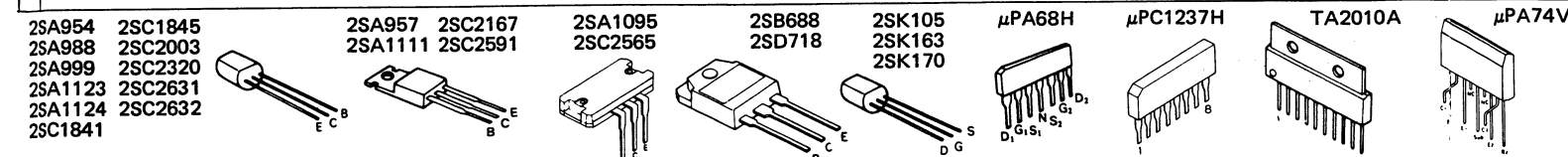
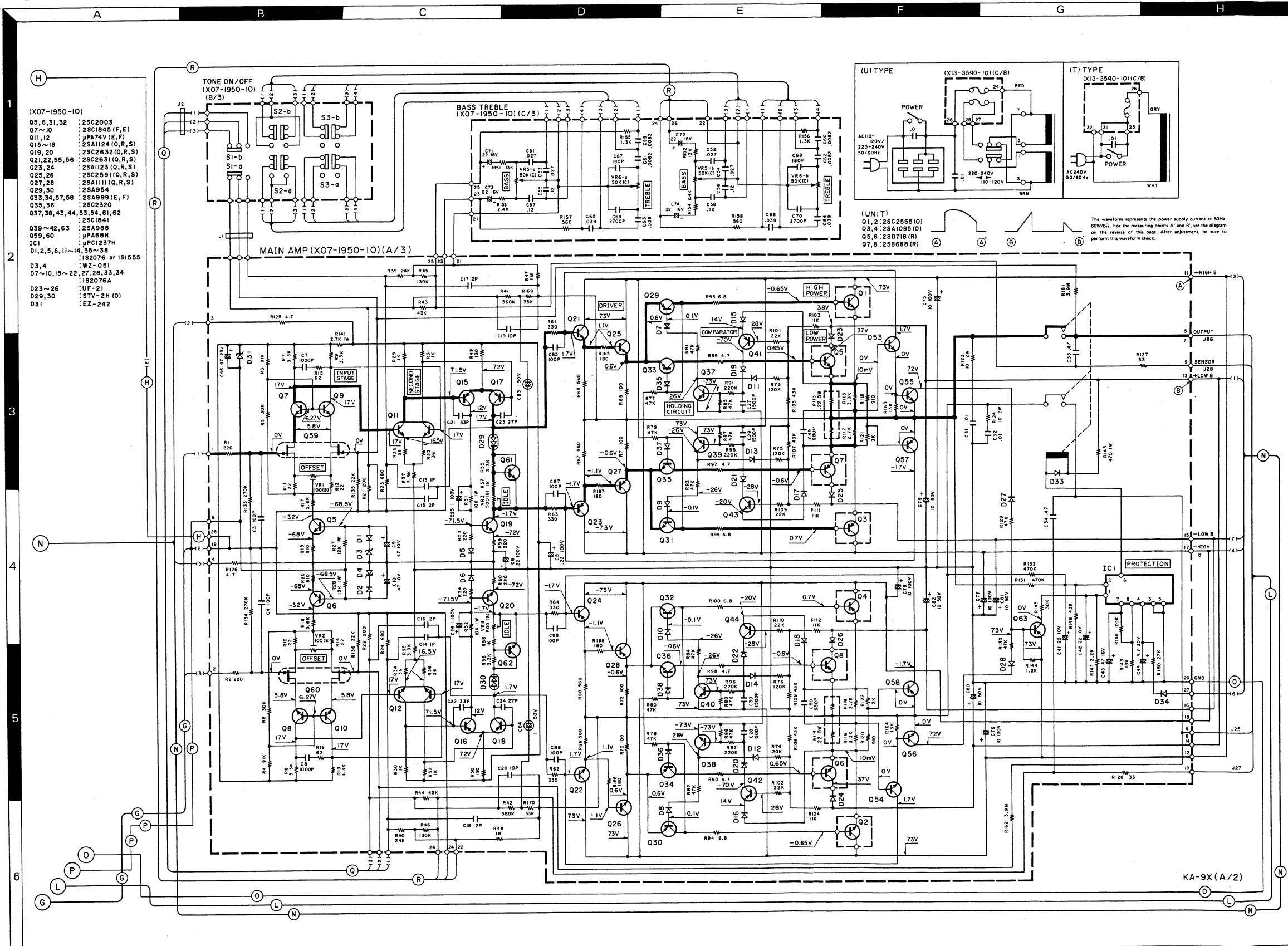


Refer to the schematic diagram for the values of resistors and capacitors.

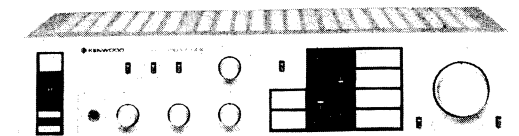
The PC board drawing is viewed from the side easy to check.

EXPLODED VIEW





- DC voltages are measured by a VOM of 20kΩ/V input impedance.
- Les tensions de courant continu sont mesurées par un multimètre d'une impédance d'entrée de 20kΩ/V.
- Die Gleichstrom-Spannungen werden durch ein Vielfachmeßgerät von 20kΩ/V Eingangs-Impedanz gemessen.



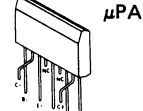
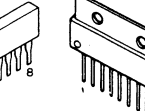
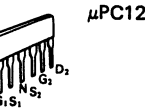
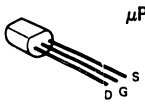
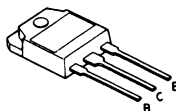
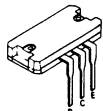
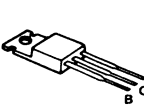
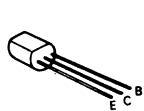
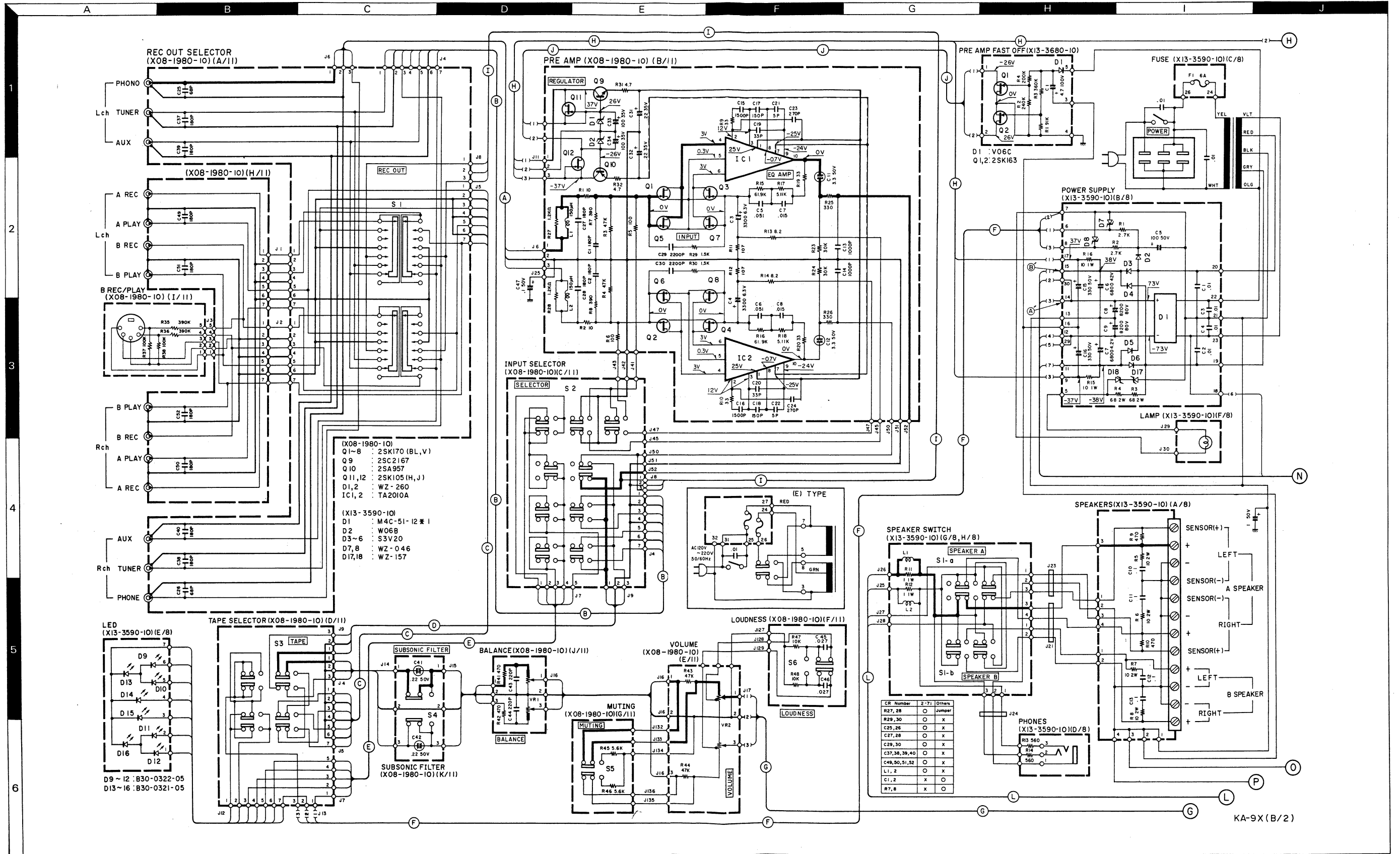
SPECIFICATIONS

Power output	
120 watts per channel minimum RMS, both channels driven, at 8 ohms from 20 Hz to 20,000 Hz with no more than 0.008% total harmonic distortion.	
Both Channel Driven into 8 ohms at 1 kHz.....130 watts	
Both Channel Driven into 4 ohms at 1 kHz.....170 watts	
Dynamic Power Output into 4 ohms.....600 watts	
Total Harmonic Distortion (20 Hz to 20,000 Hz)	
AUX input to SPEAKER output.....0.008% at rated power into 8 ohms	
AUX input to 8 ohms.....0.008% at 1/2 rated power into 8 ohms	
Intermodulation Distortion (60 Hz: 7 kHz = 4:1)	
Damping Factor.....1,000 at 100 Hz	
Transient Response	
Rise Time.....1.7 μs	
Slew Rate.....≥ 100 V/μs	
Frequency Response.....DC to 200 kHz, -3 dB	
Speaker Impedance.....Accept 4 ohms to 16 ohms	
Input Sensitivity/Impedance	
Phono (MM).....2.5 mV/47 kohms	
Phono (MC).....0.2 mV/100 ohms	
Tuner, AUX, Tape A, B.....150 mV/47 kohms	
Signal-to-Noise Ratio (IHF, A)	
Phono (MM).....87 dB for 2.5 mV input	
Phono (MC).....93 dB for 0.5 mV input	
99 dB for 10 mV input	
76 dB for 0.25 mV input	
76 dB for 0.5 mV input	
107 dB for 150 mV input	
Tuner, AUX, Tape A, B.....	
Maximum Input Level	
Phono (MM).....250 mV (RMS), T.H.D. 0.008% at 1,000 Hz	
Phono (MC).....20 mV (RMS), T.H.D. 0.008% at 1,000 Hz	
Output Level/Impedance	
Tape REC (Pin).....150 mV/330 ohms	
(DIN).....30 mV/80 kohms	
Phono Frequency Response.....RIAA standard curve ± 0.3 dB (20 Hz to 20,000 Hz)	
Tone Control	
Bass Turnover Freq. 200 Hz.....± 10 dB at 50 Hz	
400 Hz.....± 10 dB at 100 Hz	
Treble Turnover Freq. 3 kHz.....± 10 dB at 10 kHz	
± 10 dB at 20 kHz	
Loudness Control.....+ 10 dB at 100 Hz (at -30 dB VOLUME Level)	
Subsonic Filter.....18 Hz, 6 dB/oct	
GENERAL	
Power Requirements.....80 Hz 120 V (U.S.A. & Canada Model)	
Model sold elsewhere incorporates switches to accommodate 50/60 Hz 110-120 V/220-240 V	
Power Consumption.....700 W (Rated power at 8 ohms)	
A.C. Outlets.....Switched 2, Unswitched 1	
Dimensions.....W 440 mm (17-5/16")	
H 109 mm (4-19/64")	
D 340 mm (13-25/64")	
Net Weight.....10.2 kg (22.4 lb)	
* Measured pursuant to Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier in U.S.A.	

Kenwood follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.

Kenwood poursuit une politique de progrès constants en ce qui concerne le développement. Pour cette raison, les spécifications sont sujettes à modifications sans préavis.

Kenwood strebt ständige Verbesserungen in der Entwicklung an. Daher bleiben Änderungen der technischen Daten jederzeit vorbehalten.



- DC voltages are measured by a VOM of 20kΩ/V input impedance.
- Les tensions de courant continu sont mesurées par un multimètre d'une impédance d'entrée de 20kΩ/V.
- Die Gleichstrom-Spannungen werden durch ein Vielfachmeßgerät von 20kΩ/V Eingangs-Impedanz gemessen.

PARTS LIST

★ New Parts

Parts without **Parts No.** are not supplied.Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
KA-9X (UNIT)			
1 3B	NO STOCK	MAIN CHASSIS	
2 2A	NO STOCK	SUB PANEL	
3 1B	NO STOCK	REAR PANEL	
4 3A	NO STOCK	BOTTOM PLATE	
5 1B	NO STOCK	HEAT SINK	
11 1A	A01-0421-02	METALLIC CABINET	*P
12 3A	A20-3105-12	FRONT PANEL ASSY	UM
12 3A	A20-3105-12	FRONT PANEL ASSY	UE
12 3A	A20-3105-12	FRONT PANEL ASSY	HX
12 3A	A20-3105-12	FRONT PANEL ASSY	E
12 3A	A20-3106-12	FRONT PANEL ASSY	*T
12 3A	A20-3129-12	FRONT PANEL ASSY	*K
-	B46-0055-30	WARRANTY CARD	P
-	B46-0060-00	WARRANTY CARD	T
-	B46-0061-30	WARRANTY CARD	K
-	B46-0062-30	WARRANTY CARD	UH
-	B46-0062-30	WARRANTY CARD	UE
-	B46-0063-13	WARRANTY CARD MILITARY	UH
-	B46-0063-13	WARRANTY CARD MILITARY	UE
-	B46-0064-20	WARRANTY CARD	X
-	B46-0078-03	WARRANTY CARD	E
-	B50-3463-00	INSTRUCTION MANUAL	*K
-	B50-3464-00	INSTRUCTION MANUAL(E)	*P
-	B50-3464-00	INSTRUCTION MANUAL(E)	MH
-	B50-3464-00	INSTRUCTION MANUAL(E)	UE
-	B50-3464-00	INSTRUCTION MANUAL(E)	UX
-	B50-3465-00	INSTRUCTION MANUAL(F)	*P
-	B50-3465-00	INSTRUCTION MANUAL(F)	MX
-	B50-3466-00	INSTRUCTION MANUAL(SP)	*M
-	B50-3467-00	INSTRUCTION MANUAL	*T
-	B50-3468-00	INST. MANUAL(E,F,D,SP)	*E
13 3A	B08-6015-04	INDICATOR	*
14 3A	B10-0318-04	FRONT GLASS	*
-	C24-1710-57	ELECTRO 1UF 50WV	UM
-	C91-0023-05	CERAMIC 0.01UF AC250V	UE
-	C91-0023-05	CERAMIC 0.01UF AC250V	HX
-	C91-0023-05	CERAMIC 0.01UF AC250V	KP
-	C91-0079-05	CERAMIC 0.01UF AC125V	TE
15 1B	E03-0035-05	AC OUTLET	KU
15 1B	E03-0035-05	AC OUTLET	MH
15 1B	E03-0035-05	AC OUTLET	UE
15 1B	E03-0035-05	AC OUTLET	X
15 1B	E03-0045-05	AC OUTLET	P
16 1B	E30-0181-05	POWER CORD	KP
16 1B	E30-0580-05	POWER CORD	E
16 1B	E30-0587-15	POWER CORD	T
16 1B	E30-0649-05	POWER CORD	X
16 1B	E30-0683-05	POWER CORD	UM
16 1B	E30-0683-05	POWER CORD	UE
16 1B	E30-0683-05	POWER CORD	H
17 3A	G01-0453-04	COIL SPRING	
-	H01-3356-04	CARTON BOX	*K
-	H01-3357-04	CARTON BOX	*P
-	H01-3357-04	CARTON BOX	UM
-	H01-3357-04	CARTON BOX	UE
-	H01-3357-04	CARTON BOX	HX

E : Scandinavia & Europe H : Audio Club K : USA P : Canada

S : South Africa T : England U : PX (Far East, Hawaii)

UE : AAFES (Europe) X : Australis M : Other Areas

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
-	H01-3357-04	CARTON BOX	E
-	H01-3358-04	CARTON BOX	*T
-	H10-1599-02	POLYSTYRENE FIXTURE	
-	H20-0452-04	COVER	
-	H25-0078-04	BAG (235x315)	
-	H25-0170-04	BAG	
18 3B	J02-0118-04	FOOT	KP
19 1B	J42-0083-05	BUSHING	UM
19 1B	J42-0083-05	BUSHING	UE
19 1B	J42-0083-05	BUSHING	HT
19 1B	J42-0083-05	BUSHING	E
19 1B	J42-0085-05	BUSHING	X
20 3A	J42-0095-05	BUSHING	
22 3A	K27-0683-04	KNOB POWER	
23 3A	K27-0684-04	KNOB SPKR.A	
24 3A	K27-0685-04	KNOB SPKR.B	
25 3A	K27-0686-03	KNOB TAPE	
26 3A	K27-0687-03	KNOB (A/B)	
27 3A	K27-0688-13	KNOB MM/MC	
28 3A	K27-0689-13	KNOB PHONO	
29 3A	K27-0690-13	KNOB TUNER	
30 3A	K27-0691-13	KNOB AUX.	
31 3A	K27-0692-04	KNOB TONE,LOUD	
32 3A	K29-0458-04	KNOB VOL.	
33 3A	K29-0459-04	KNOB REC,BAL,TONE	
34 1A	L01-2481-05	POWER TRANS	*K
34 1A	L01-2481-05	POWER TRANS	P
34 1A	L01-2482-15	POWER TRANS	*T
34 1A	L01-2485-05	POWER TRANS	*U
34 1A	L01-2485-05	POWER TRANS	MH
34 1A	L01-2485-05	POWER TRANS	UE
34 1A	L01-2485-05	POWER TRANS	X
34 1A	L01-2486-15	POWER TRANS	*E
35 1B	H08-0128-35	GND TERMINAL	
-	S31-2050-05	SLIDE SWITCH(POWER)	UM
-	S31-2050-05	SLIDE SWITCH(POWER)	UE
-	S31-2050-05	SLIDE SWITCH(POWER)	HX
-	S31-2050-05	SLIDE SWITCH(POWER)	E
37 2B	S40-1014-05	PUSH SWITCH (POWER)	UM
37 2B	S40-1014-05	PUSH SWITCH (POWER)	UE
37 2B	S40-1014-05	PUSH SWITCH (POWER)	HX
37 2B	S40-1015-05	PUSH SWITCH (POWER)	KP
37 2B	S40-1047-05	PUSH SWITCH (POWER)	TE
39 2B	S90-0056-05	SWITCH SHAFT	
40 2A	V01-1095-60	2SA1095(O) Q3,4	
41 2A	V02-0688-20	2SB688(R) Q7,8	
42 2A	V03-2565-70	2SC2565(O) Q1,2	
43 2A	V04-0718-20	2SD718(R) Q5,6	
44 2A	X07-1950-01	POWER AMP PCB ASSY	*U
44 2A	X07-1950-01	POWER AMP PCB ASSY	MH
44 2A	X07-1950-01	POWER AMP PCB ASSY	UE
44 2A	X07-1950-01	POWER AMP PCB ASSY	XT
44 2A	X07-1950-10	POWER AMP PCB ASSY	*K
44 2A	X07-1950-10	POWER AMP PCB ASSY	P
44 2A	X07-1952-71	POWER AMP PCB ASSY	*E
45 2B	X08-1980-10	PRE AMP PCB ASSY	*K
45 2B	X08-1980-10	PRE AMP PCB ASSY	P
45 2B	X08-1980-81	PRE AMP PCB ASSY	*U

E : Scandinavia & Europe H : Audio Club K : USA P : Canada

S : South Africa T : England U : PX (Far East, Hawaii)

UE : AAFES (Europe) X : Australis M : Other Areas

PARTS LIST

★ New Parts

Parts without **Parts No.** are not supplied.Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
45 2B	X08-1980-81	PRE AMP PCB ASSY	MH
45 2B	X08-1980-81	PRE AMP PCB ASSY	UE
45 2B	X08-1980-81	PRE AMP PCB ASSY	XT
45 2B	X08-1982-71	PRE AMP PCB ASSY	*E
46 1A	X13-3590-10	SUB PCB ASSY	*K
46 1A	X13-3590-10	SUB PCB ASSY	P
46 1A	X13-3590-51	SUB PCB ASSY	*T
46 1A	X13-3590-81	SUB PCB ASSY	*U
46 1A	X13-3590-81	SUB PCB ASSY	MH
46 1A	X13-3590-81	SUB PCB ASSY	UE
46 1A	X13-3590-81	SUB PCB ASSY	X
46 1A	X13-3592-71	SUB PCB ASSY	*E
47 2A	X13-3680-10	SUB PCB ASSY	*
POWER AMP (X07-1950-10)			
C3 ,4	C71-1710-15	CERAMIC 100PF J	
C5 ,6	C24-2022-47	ELECTRO 0.22UF 100WV	
C7 ,8	C52-1710-26	CERAMIC 0.001UF K	
C9 ,10	C24-1047-67	ELECTRO 47UF 10WV	
C13 ,14	C71-1701-01	CERAMIC 1PF C	KP
C13 ,14	C71-1703-01	CERAMIC 3PF C	E
C15 ,16	C71-1702-01	CERAMIC 2PF C	
C17 ,18	C71-1702-01	CERAMIC 2PF C	
C19 ,20	C71-1710-02	CERAMIC 10PF D	
C21 ,22	C71-1733-05	CERAMIC 33PF J	
C23 ,24	C71-1727-05	CERAMIC 27PF J	
C25 ,26	C24-2010-57	ELECTRO 1UF 100WV	
C27 ,28	C52-1715-26	CERAMIC 0.0015UF K	
C29 ,30	C52-1715-26	CERAMIC 0.0015UF K	
C31 ,32	C46-1710-36	MYLAR 0.01UF K	
C33 ,34	C46-1747-46	MYLAR 0.47UF K	
C39 ,40	C71-1747-05	CERAMIC 47PF J	E
C41	C26-1022-67	ELECTRO 22UF 10WV	
C42	C24-1022-67	ELECTRO 22UF 10WV	
C43	C25-1247-67	LL-ELEC 47UF 16WV	
C44	C25-6547-57	ELECTRO 4.7UF 35WV	
C46	C24-1447-67	ELECTRO 47UF 25WV	
C49 ,50	C52-1768-16	CERAMIC 680PF K	
C51 ,52	C46-1727-36	MYLAR 0.027UF K	
C53 ,54	C46-1727-36	MYLAR 0.027UF K	
C55 ,58	C46-1712-46	MYLAR 0.12UF K	
C59 ,60	C46-1782-26	MYLAR 0.0082UF K	
C61 ,62	C46-1782-26	MYLAR 0.0082UF K	
C63 ,66	C46-1739-36	MYLAR 0.039UF K	
C67 ,68	C47-1718-15	POLYSTY 180PF J	
C69 ,70	C46-1727-26	MYLAR 0.0027UF K	
C71 ,74	C24-1226-67	ELECTRO 22UF 16WV	
C75 ,78	C24-2010-67	ELECTRO 10UF 100WV	
C79 ,82	C24-1710-67	ELECTRO 10UF 50WV	
C83 ,84	C26-1710-57	NP-ELEC 1UF 50WV	
C91 ,94	C71-1710-15	CERAMIC 100PF J	
R27 ,28	R47-5412-35	FL-PROOF RS12K J 3A	
R27 ,28	R47-5412-35	FL-PROOF RS12K J 3A	
R29 ,32	R42-1210-25	FL-PROOF 1K J 2E	
R43 ,44	R49-6243-33	RN 43K F 2E	
R49 ,50	R43-1213-15	FL-PROOF RD130 J 2E	
R51 ,52	R47-5410-35	FL-PROOF RS 10K J 3A	
R53 ,54	R43-1222-15	FL-PROOF RD220 J 2E	
R59 ,60	R43-1222-15	FL-PROOF RD220 J 2E	
R61 ,64	R43-1233-15	FL-PROOF RD330 J 2E	
R65 ,68	R43-1256-15	FL-PROOF RD560 J 2E	
R69 ,72	R43-1210-15	FL-PROOF RD100 J 2E	

For POWER AMP

K : X07-1950-10

P : X07-1951-01

E : X07-1952-71

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
R89 ,90	R43-1247-95	FL-PROOF RD4.7 J 2E	
R93 ,94	R43-1268-95	FL-PROOF RD6.8 J 2E	
R97 ,98	R43-1247-95	FL-PROOF RD4.7 J 2E	
R99 ,100	R43-1268-95	FL-PROOF RD6.8 J 2E	
R113 ,114	R90-0187-05	MULTIPLE COMPONENTS	
R123 ,124	R47-5510-05	FL-PROOF RS10 J 3D	
R125 ,126	R43-1247-95	FL-PROOF RD4.7 J 2E	
R127 ,128	R43-1233-05	FL-PROOF RD33 J 2E	
R141	R47-5427-25	FL-PROOF RS2.7K J 3A	
R143	R47-5447-15	FL-PROOF RS470 J 3A	PE
R143	R47-5468-15	FL-PROOF RS680 J 3A	K
R161 ,162	R40-8339-57	RC 3.9M M 2H	
R165 ,168	R43-1218-15	FL-PROOF RD180 J 2E	
VR1 ,2	R12-0502-05	TRIMMING POT.	
VR3 ,4	R12-0302-05	TRIMMING POT.	
VR5 ,6	R06-4053-05	POTENTIOMETER	
RL1	S51-2045-05	RELAY	
S1	S42-3049-05	PUSH SWITCH	
D1 ,2	V11-0271-05	1S2076	
D3 ,4	V11-4103-60	XZ-051	
D5 ,6	V11-0271-05	1S2076	
D7 ,10	V11-0273-05	1S2076A	
D11 ,14	V11-0271-05	1S2076	
D15 ,22	V11-0273-05	1S2076A	
D23 ,26	V11-5102-30	UF-21	
D27 ,28	V11-0273-05	1S2076A	
D29 ,30	V11-5101-70	STV-2H(O)	
D31	V11-4109-40	EZ-242	
D33 ,34	V11-0273-05	1S2076A	
D35 ,38	V11-0271-05	1S2076	
IC1	V30-0678-10	UPC1237H	
Q5 ,6	V03-2003-00	2SC2003	
Q7 ,10	V03-1845-10	2SC1845(F,E)	
Q11 ,12	V30-0547-10	UPA74V(F,E)	
Q15 ,18	V01-1124-20	2SA1124(Q,R,S)	
Q19 ,20	V03-2632-20	2SC2632(Q,R,S)	
Q21 ,22	V03-2631-10	2SC2631(Q,R,S)	
Q23 ,24	V01-1123-10	2SA1123(Q,R,S)	
Q25 ,26	V03-2591-20	2SC2591(Q,R,S)	
Q27 ,28	V01-1111-20	2SA1111(Q,R,S)	
Q29 ,30	V01-0954-00	2SA954	
Q31 ,32	V03-2003-00	2SC2003	
Q33 ,34	V01-0999-10	2SA999(E,F)	
Q35 ,36	V03-2320-00	2SC2320	
Q37 ,38	V03-1841-00	2SC1841	
Q39 ,42	V01-0988-00	2SA988	
Q43 ,44	V03-1841-00	2SC1841	
Q53 ,54	V03-1841-00	2SC1841	
Q55 ,56	V03-2631-10	2SC2631(Q,R,S)	
Q57 ,58	V01-0999-10	2SA999(E,F)	
Q59 ,60	V30-0716-10	UPA68H(K,L)	
Q61 ,62	V03-1841-00	2SC1841	
Q63	V01-0988-00	2SA988	
PRE AMP (X08-1980-10)			
C1 ,2	C71-1718-15	CERAMIC 180PF J	KU
C3 ,4	C24-0833-87	ELECTRO 330UF 6.3WV	
C5 ,6	C49-2051-34	POLYPRO 0.051UF G	
C7 ,8	C49-2015-34	MYLAR 0.015UF J	
C11 ,12	C26-1733-57	NP-ELEC 3.3UF 50WV	
C13 ,14	C47-1710-25	POLYSTY 1000PF J	
C15 ,16	C52-1715-26	CERAMIC 0.0015UF K	

For PRE AMP

K : X08-1980-10

U : X08-1980-81

E : X08-1982-71

KA-9X/G

KA-9X/G

KA-9X/G

PARTS LIST

★ New Parts

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Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
C17 ,18	C71-1715-15	CERAMIC 150PF J	
C19 ,20	C71-1733-05	CERAMIC 33PF J	
C21 ,22	C71-1705-01	CERAMIC 5PF C	
C23 ,24	C71-1727-15	CERAMIC 270PF J	
C25 ,26	C71-1768-05	CERAMIC 68PF J	E
C27 ,28	C71-1718-15	CERAMIC 180PF J	E
C29 ,30	C52-1722-26	CERAMIC 0.0022UF K	E
C31 ,32	C46-1710-36	MYLAR 0.01UF K	
C33 ,34	C24-6510-77	ELECTRO 100UF 35WV	
C41 ,42	C26-1722-47	NP-ELEC 22UF 50WV	
C43 ,44	C71-1722-15	CERAMIC 220PF J	
C45 ,46	C46-1727-36	MYLAR 0.027UF K	
C47	C24-1710-47	ELECTRO 0.1UF 50WV	
-	E06-0510-05	CONNECTOR	
-	E13-0432-05	PHONO JACK	
-	E13-0618-05	PHONO JACK	
-	E40-0556-05	PIN CONNECTOR	
-	E40-0756-05	PIN CONNECTOR	
L1 ,2	L40-1511-43	INDUCTOR	E
R11 ,12	R48-2107-03	RN 107 F 2E	
R13 ,14	R48-6282-95	RN 8,2 J 2E	
R15 ,16	R48-2619-23	RN 61,9K F 2E	
R17 ,18	R48-2511-13	RN 5,11K F 2E	
R19 ,20	R48-2233-05	RN 33 J 2E	
R31 ,32	R43-1247-95	FL-PROOF RD4,7 J 2E	
VR1	R06-5062-05	POTENTIOMETER	
VR2	R06-5087-05	POTENTIOMETER	
S1	S90-0038-05	SLIDE SWITCH	
S2	S42-4018-05	PUSH SWITCH	
S3	S42-2055-05	PUSH SWITCH	
S4 -6	S40-2122-05	PUSH SWITCH	
D1 ,2	V11-0358-05	WZ-260	
IC1 ,2	V30-0520-10	TA2010A	
Q1 -8	V09-0158-20	2SK170(BL)	
Q9	V03-2167-00	2SC2167	
Q10	V01-0957-00	2SA957	
Q11 ,12	V09-0127-40	2SK105(H,J)	
SUB (X13-3590-10)			
46 2A	B30-0320-05	LAMP	
D9 -12	B30-0322-05	LAMP	
D13 -16	B30-0321-05	LAMP	
C1 -4	C54-2710-39	CERAMIC 0.01UF P	
C5	C24-1710-77	ELECTRO 100UF 50WV	
C6 ,7	C90-0576-05	ELECTRO 6800UF 42WV	
C8 ,9	C90-0572-05	ELECTRO 8200UF 80WV	
C10 -13	C46-1710-46	MYLAR 0.1UF K	
C14	C91-0079-05	CERAMIC 0.01UF AC125V	
C15 ,16	C24-1733-77	ELECTRO 330UF 50WV	
-	E11-0093-05	PHONE JACK	
-	E20-0814-05	TERMINAL BOARD SPEAKER	
F1	F05-3122-05	FUSE 250V,F3,15A	TE
F1	F05-6021-05	FUSE 250V, 6A	U
F1	F05-7026-05	FUSE 250V, 7A	K
F2	F05-3022-05	FUSE 250V, 3A	U
F2	F05-6322-05	FUSE 250V,F6,3A	E
-	J13-0041-05	FUSE HOLDER	KU
-	J13-0054-05	FUSE HOLDER	TE
L1 ,2	L39-0085-05	COIL	

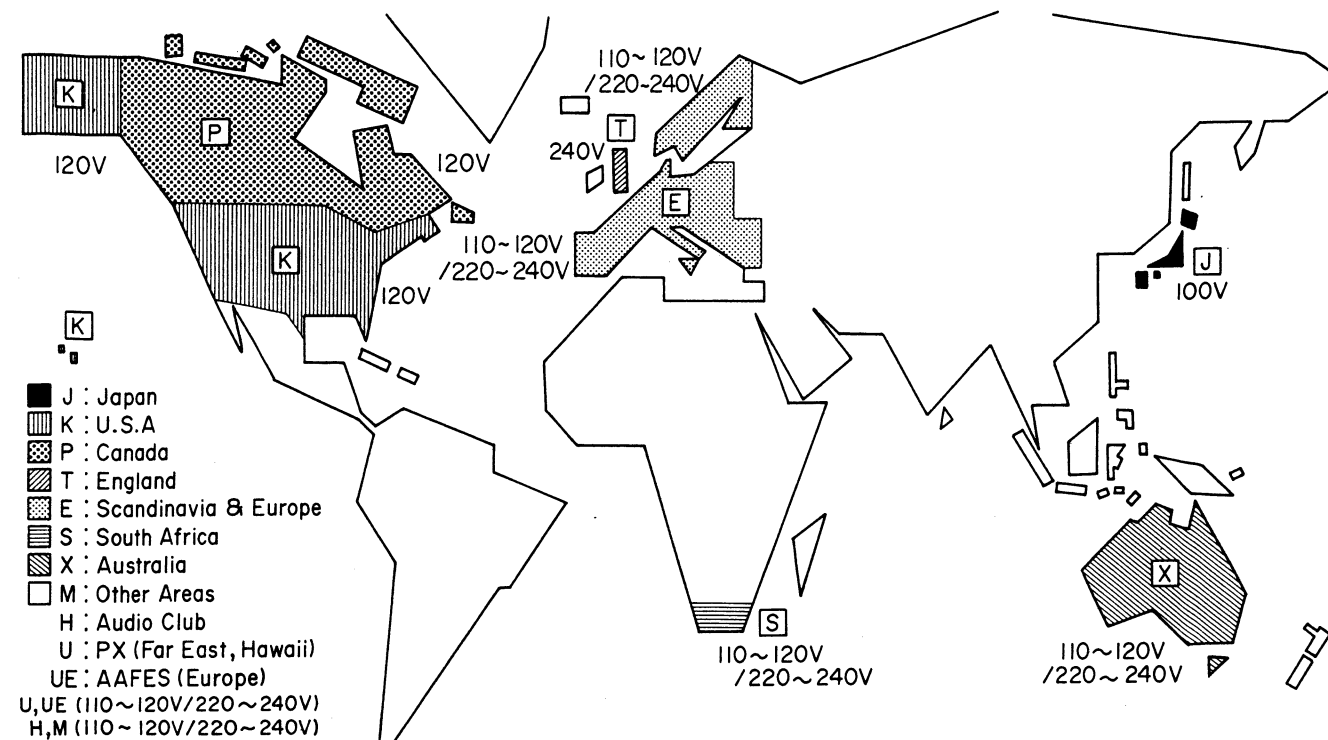
For SUB

K : X13-3590-10 T : X13-3590-51

U : X13-3590-81 E : X13-3592-71

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
R1 ,2	R47-5427-25	FL-PROOF RS2,7K J 3A	
R3	R47-5568-05	FL-PROOF RS68 J 3D	
R3	R47-5582-05	FL-PROOF RS82 J 3D	
R4	R47-5568-05	FL-PROOF RS68 J 3D	
R4	R47-5582-05	FL-PROOF RS82 J 3D	
R5 -8	R47-5510-05	FL-PROOF RS10 J 3D	
R9 ,10	R47-5547-15	FL-PROOF RS470 J 3D	
R11 ,12	R47-5401-05	FL-PROOF RS1 J 3A	
R13 ,14	R47-5556-15	FL-PROOF RS560 J 3D	
R15 ,16	R47-5410-05	FL-PROOF RS10 J 3A	
S1	S42-2056-05	PUSH SWITCH	
D1	V11-2101-40	M4C-51-12*1	
D2	V11-0295-05	W06B	
D3 -6	V11-1300-10	S3V20	
D7 ,8	V11-4112-00	WZ-046	
D17 ,18	V11-4103-80	WZ-157	
SUB(X13-3680-10)			
C1	C24-2047-57	ELECTRO 4,7UF 100WV	
-	E23-0047-04	TERMINAL	
D1	V11-0200-05	V06C	
Q1 ,2	V09-0144-20	2SK163(M,N)	

WORLD MAP & AREA CODE



Note:

Component and circuitry are subject to modification to insure best operation under differing local conditions. This manual is based on, the U.S. (K) standard, and provides information on regional circuit modification through use of alternate schematic diagrams, and information on regional component variations through use of parts list.

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